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# PACKAGING, CURING, AND MERCHANDISING AMERICAN CHEDDAR CHEESE IN CANS

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## INTRODUCTION

Many efforts have been made to develop methods for packaging American Cheddar cheese in units of a size suitable for direct sale to the consumer, in the belief that the public would favor such a package and would thus consume more cheese. Experiments [1] during the last 6 years in the research laboratories of the Bureau of Dairy Industry have resulted in the development of an attractive commercial package, suitable for merchandising natural Cheddar cheese. The process consists essentially in sealing the freshly made curd in valve-equipped cans, in which normal ripening takes place, and in which the cheese is also retailed to the consumer. The valve-vented can permits the escape of gases produced in the ripening process but excludes air and thus prevents the development of molds on the cheese.

Canned cheese has distinctive features that should appeal to the prospective manufacturer. The entire manufacturing and canning process may be completed within 36 hours after the milk is received at the factory, and no other work is necessary since curing takes place in the cans. Another advantage is that there is no shrinkage in weight during curing. Loss in weight during curing is a factor which must be taken into account in making cheese by the usual methods. For example, when Daisy, Longhorn, or other styles of Cheddar cheese are made and held in a drying room at a temperature of from 50° to 60° F., the shrinkage from the time the cheese is taken out of the press until it is dry enough to paraffin will average about 1.5 percent. During the summer months, in factories that do not have mechanical refrigeration and in which the temperature of the drying room is 70° or higher, the shrinkage will be greater. Even after Daisies or Longhorns are paraffined, there will be additional shrinkage if they are held for several months.

[1] Rogers, L. A. RIPENING CHEESE IN A SEALED PACKAGE. Jour. Dairy Sci. 15: 185–189, illus. 1932.

Packaging cheese in cans should appeal to the manufacturer who desires to establish a reputation for high-quality cheese, because it enables him to properly brand or label his product. It also eliminates the labor of cutting, weighing, and wrapping involved in retailing bulk cheese, as well as the costs incidental to these operations. Eliminating these costs, as well as losses from shrinkage in curing, largely offsets the extra cost of canning and enables the distributor to place the packaged product in the hands of the consumer at a favorable price. Also there is no rind on the cheese when it is removed from the can, regardless of how long it has been held. Since the cheese is packaged in a sealed container immediately after it is taken from the press, the process is advantageous from the standpoint of sanitation, which makes an excellent advertising feature.

The cheese may be packaged in either round or square cans, the size and shape depending mainly on the purpose or the market for which the cheese is made. In the experimental work most of the cheese has been packaged in 12-ounce round prints, suitable for direct sale to the consumer; it has also been put in round cans of 1-, 2-, 8-, and 20-pound capacity. Some has been packaged in oblong cans of 5-pound capacity, a convenient size and shape for use in establishments serving cheese sandwiches. Another possibility would be to pack 20 half-pound prints, wrapped individually in moisture-resistant material, in one 10-pound valve-vented can in which the cheese would be cured and delivered to the retailer. The cheese would cost less per pound than if the prints were packaged in individual cans. Such a 10-pound package, which would be opened in the retail store, would be suitable for stores selling as much as 20 half-pound prints within a few days.

In making Cheddar cheese for canning the procedure is the same (up to the time the curd is ready for hooping) as in making this type of cheese for curing in the usual way. The purpose of this circular is to describe the procedure by which the milled curd is put in the hoops, pressed, cut into prints of the desired weight, and packed in the valve-vented cans in which it is cured and merchandised; and also to show the comparative cost of making Cheddar cheese in the form of Daisies, and making and packaging 12-ounce round prints and 5-pound oblong prints in cans.

## EQUIPMENT AND SUPPLIES

In addition to the equipment and supplies required when Cheddar cheese is made in the usual way, up to the time of hooping the curd, the following equipment and supplies will be needed when the cheese is to be canned:

(1) Special hoops for forming the milled curd into loaves of suitable size and shape.
(2) Cotton-cloth wrappers and press cloths.
(3) Equipment for cutting the loaves into prints.
(4) Material for wrapping the prints prior to sealing them in cans.
(5) Valve-vented cans.
(6) Machine for sealing the cans.
(7) Shipping cartons.

Special hoops for forming the milled curd into loaves of the desired size and shape may be made to order by firms handling dairy equipment and supplies if not available in stock. Figure 1 shows a satisfactory type of hoop in two sizes and shapes. These hoops, which cost about $2.50 each, are so constructed that they can be easily and quickly filled and the pressed curd can be removed without difficulty. The oblong hoop (fig. 1, *A*) is designed for pressing about 5¼ pounds of curd into a loaf 10½ by $3\frac{5}{16}$ by $3\frac{13}{16}$ inches, the loaf to be canned as one 5-pound print. The round hoop (fig. 1, *B*) is designed for pressing about 8¾ pounds of curd into a loaf 17 inches long and $3\frac{13}{16}$ inches in diameter. This loaf may be cut into 1-pound, 2-pound, or 12-ounce prints.

In ordering hoops made care should be taken to have the inside dimensions of the hoops less than the inside dimensions of the cans in which the cheese is to be packaged. This will result in the prints

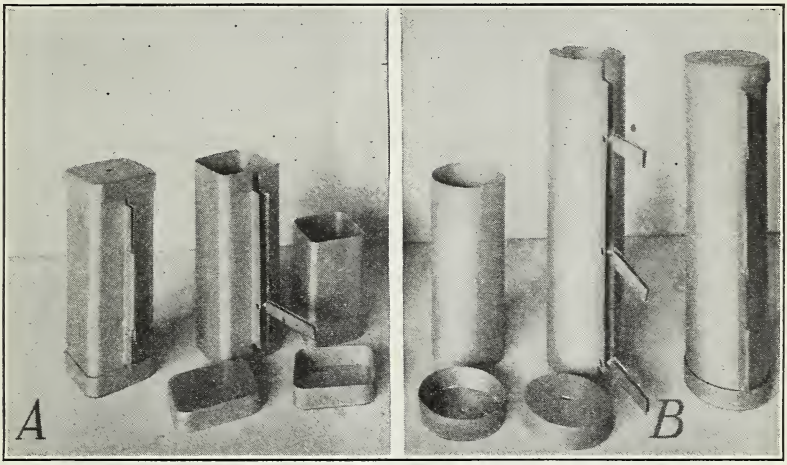


FIGURE 1.—A satisfactory type of special hoop for forming the milled curd into loaves of the desired size and shape: *A*, For canning a 5-pound oblong print; *B*, for canning 1-pound, 2-pound, or 12-ounce round prints.

being smaller than the container, which will facilitate the removal of the wrapped print of cured cheese when it is ready for consumption. In canning round prints that are less than 6 inches long the internal diameter of the hoops should be three-sixteenths of an inch less than that of the cans, and for prints more than 6 inches long it should be from five-sixteenths to eight-sixteenths of an inch less. Similar differences should apply to oblong hoops and cans.

Cloth wrappers, or bandages, and cap cloths will be needed for dressing the loaves of cheese after they have been pressed in the hoops for 30 to 60 minutes. Both wrappers and cap cloths may be made from medium-weight, unbleached cotton cloth. Wrappers should be as wide as the loaf is long and long enough to go 1¼ times around the loaf. The cap cloths should be of the same shape and size as the end or cross section of the loaf. All cloths should be cut a little large to take care of shrinkage. About three sets of wrappers and cap cloths should be made in order that they may be washed daily and kept in good condition.

For cutting the loaves into prints of the desired weight, either a disk-slicing machine or a wire cutter will be satisfactory. A disk-slicing machine may be adjusted to cut prints of any desired size, and although it will cut but one print at a time, this can be done rapidly and accurately. A wire cutter, on the other hand, may have enough wires so that an 8¼-pound loaf can be cut into eleven 12-ounce prints at one time. A miter box, which may be made by the cheesemaker, may also be used.

Cellophane, parchment paper, waxed glassine, aluminum foil, or other suitable material will be needed for wrapping the prints, prior to sealing them in the cans. The wrapping materials selected should be such that it will prevent contact of the cheese with the can, facilitate removal of the cured cheese, and give the print an attractive appearance when the can is opened by the consumer.

The valve-vented cans in which the cheese is cured and merchandised must be of suitable construction and free from defects because the smallest leak will result in moldy cheese. The Bureau of Dairy Industry, in its experimental work, has in most instances used a packer's type of can (fig. 2), on which was assembled a valve of special design that permits gases to escape from the can without admitting air.

Valve-vented cans of the type used in the experimental work may be obtained in any quantity from the manufacturer, the price varying according to the size of the can and the quantity purchased. At present, the round cans of 12-ounce capacity cost approximately $42 a thousand and the oblong cans of 5-pound capacity cost about $117 a thousand. In ordering cans care should be taken to ascertain the inside dimensions.

A machine for sealing the cans may be rented from a can-manufacturing company, at a low rental cost.

Corrugated fiber boxes of 175-pound test will serve as shipping cartons. A carton 17⅛ inches long, 12⅞ inches wide, and 4⅝ inches deep will hold twenty-four 12-ounce cans, and a carton 11 inches long, 8¼ inches wide, and 11 inches deep, will hold six 5-pound cans of the type shown in figure 2.

## QUALITY OF CHEESE IMPORTANT

It is generally recognized that good quality in cheese, as in any other food, is important from the standpoint of creating and maintaining consumer demand. Good quality in the finished cheese is largely dependent on the quality of the curd from which it is made, especially when it is to be held for marketing as aged cheese.

Curd that has not been properly firmed in the whey or that contains an excessive amount of moisture or acid will not make a satisfactory aged product, regardless of whether it is cured in the usual way or in the valve-vented cans. Since most canned cheese will likely be held for marketing as aged cheese, it is especially important to use only high-quality curds having a moisture content of not more than 37.5 percent.

In order to be reasonably sure at the time of hooping the curd that it will make good aged cheese, the milk should always be carefully graded and a complete record should be kept of each vat of cheese made. (See blank form, p. 7.) Then, by considering the

quality of the milk together with other pertinent information recorded during the making process, a well-trained cheesemaker will be able to determine by examining the curd (at the time of milling) whether it will make cheese that will score 91 or better. If it will not make cheese of that quality, the curd should be made up into Daisies, Twins, or Longhorns, to be cured and marketed in the usual


FIGURE 2.—Valve-vented cans of the type used in experimental work by the Bureau of Dairy Industry: *A*, For canning 12-ounce prints for direct sale to the consumer; *B*, for canning a 5-pound print, suitable in size and shape for use in establishments serving cheese sandwiches.

manner. This will prevent the canning of cheese that will later have to be sold to a processor.

Since there is no loss in moisture during the ripening period only green cheese that contains a legal amount (not more than 39 percent) of moisture should be canned.

Fast-working curds or cheese containing too much acid will often develop a bitter flavor in from 3 to 4 months. In making experi-

mental packs the cheese that developed a bitter flavor was made from curd the serum of which contained 0.7 percent or more acid in less than 2 hours from time of dipping.

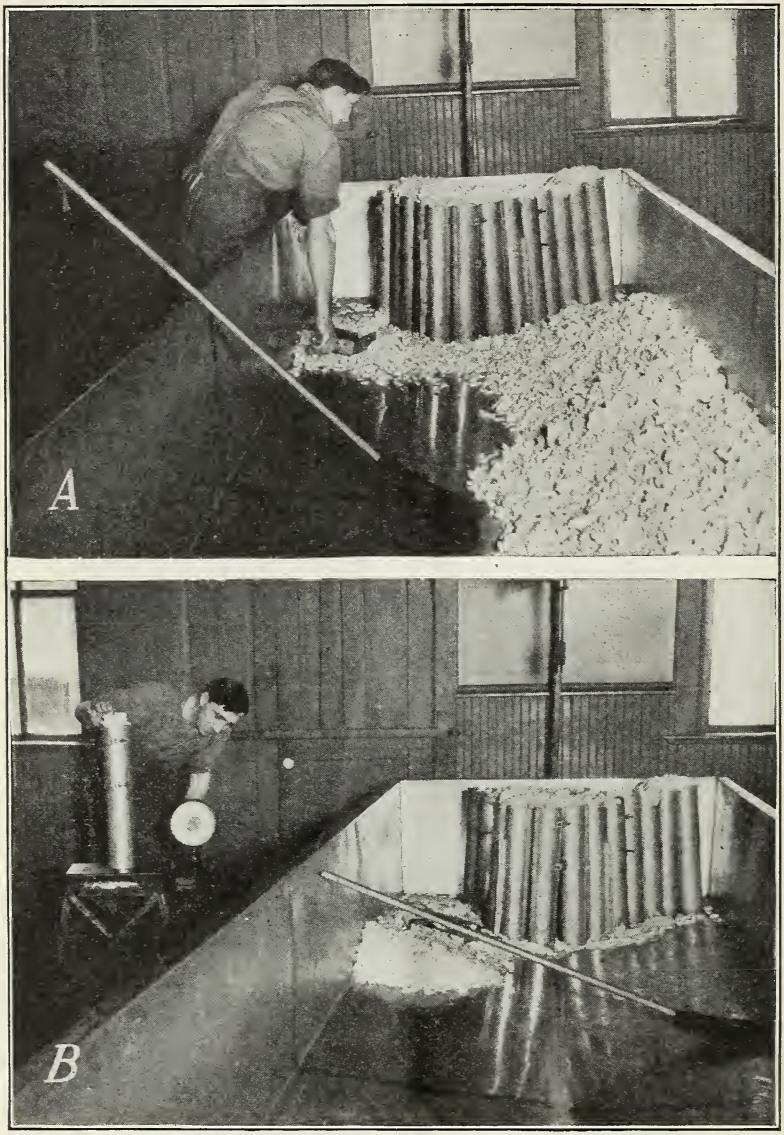


FIGURE 3.—*A*, Filling the hoops with curd; *B*, weighing the filled hoops.

## HOOPING THE CURD

The hoops are not dressed before they are filled, as is usually done in making Daisies or other common styles. The hoops are placed close together in the upper end of the vat (fig. 3, *A*) and filled by

scooping the curd on top of them. After the hoops have been well filled and covered with curd, they should stand in the vat for about 10 or 15 minutes. This gives the curd a chance to settle, which saves packing each individual hoop. During the settling period the vat should be kept covered, and in cool weather steam should be turned into the jacket of the vat to keep the curd warm.

VAT-RECORD FORM

Vat no. _____ Lot no. _____ Date_____
Whole milk used_____lb. _____percent fat _____lb. fat
Skim milk used_____lb.
Starter used_____lb. _____hours old ___percent acidity
Total in vat_____lb. _____percent fat _____lb. fat

When pasteurized the milk was heated to _____°F. and held _____ minutes at that temperature or was heated to _____°F. flash method.

Color used per 1,000 lb. milk _____oz. Total quantity used _____oz.
Rennet used per 1,000 lb. milk _____oz. Total quantity used _____oz.
Salt used per 1,000 lb. milk _____lb. Total quantity used _____lb.

| Operation | Time | Acidity | Temperature (°F.) | Remarks |
|---|---|---|---|---|
| Milk received | | | | |
| Starter added | | | | |
| Rennet added | | | | |
| Coagulation | | | | |
| Cutting | | | | |
| Steam on | | | | |
| Steam off | | | | |
| Dipping | | | | |
| Packing | | | | |
| Milling | | | | |
| Salting | | | | |
| Hooping | | | | |
| Pressing | | | | |
| Dressing | | | | |

RECORD OF CHEESE CANNED

| | 12-ounce cans | 1-pound cans | 2-pound cans | 5-pound cans | | | Total pounds canned |
|---|---|---|---|---|---|---|---|
| Number of cans | | | | | | | |

Yield per 100 lb. milk_____lb. Yield per lb. fat_____
Moisture in green cheese_____percent. Fat in green cheese_____percent.
Whey cream _____lb. _____percent fat. _____lb. fat

GRADE OF CHEESE

| Age | Score | Criticisms |
|---|---|---|
| 2 months | | |
| 6 months | | |
| 1 year | | |

_____
Cheesemaker

After the curd has settled sufficiently, each filled hoop should be weighed (fig. 3, *B*). Sufficient curd should be added or removed so that each hoop will contain the proper amount of curd when it is put in the press. This will avoid having unnecessary trimmings

after the loaf has been cut into prints of the desired weight. The normal shrinkage in weight in the press will range from 5 to 7 percent. As it is better to have the loaf a little too heavy rather than too light, it is best during the first few days of operation to allow for a 7-percent shrinkage until the exact amount of shrinkage is known.

The weight of the prints to be canned should be considered when the curd is being weighed into the hoops. For example, if the loaf is to be cut into 2-pound prints the weight of each pressed loaf should be in multiples of 2 pounds; if it is to be cut into 12-ounce prints, the weight should be in multiples of 12 ounces. A loaf of cheese weighing 8 pounds is a very convenient size for canning 1- or 2-pound prints. Allowing for a 7-percent shrinkage in the press, 8.6 pounds of curd should be weighed into each hoop. A loaf weighing 8¼ pounds, or 132 ounces, will make a convenient size for canning 12-ounce prints. Allowing for 7-percent shrinkage, about 8¾ pounds, or 142 ounces, of curd should be weighed into each hoop. In canning the 5-pound oblong prints, 5.4 pounds of curd should be weighed into each hoop.

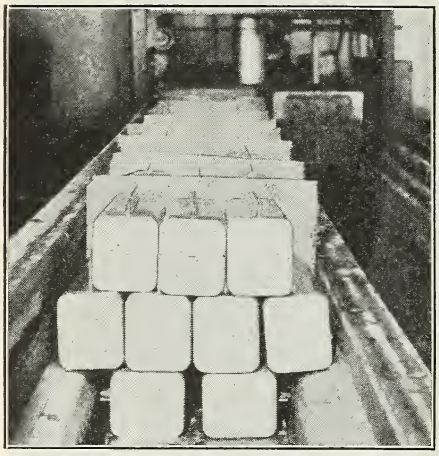

FIGURE 4.—Position of hoops in a Daisy press.

## PRESSING THE CURD

The curd can be pressed in a Daisy or Longhorn press. In a Daisy press as many as 11 rows of either round or oblong hoops can be placed in each press row (fig. 4). The number of hoops lengthwise of the press will depend on the length of the press and the length of the hoops. Table 1 shows the number of round hoops and pounds of cheese that can be pressed in a single- or double-row Daisy press. Practically the same quantity of curd can be pressed in the oblong hoops as is estimated for the round hoops.

TABLE 1.—*Number of round hoops and the quantity of cheese that can be pressed in single- or double-row Daisy cheese presses of different lengths, using hoops 17 inches long and 4 inches in diameter that hold 8 pounds of cheese each*[1]

| Press length (feet) | Hoops lengthwise | Hoop rows in press row | Hoops in one press row | Cheese in one press row | Cheese in double press row |
|---|---|---|---|---|---|
| | *Number* | *Number* | *Number* | *Pounds* | *Pounds* |
| 16 | 9 | 11 | 99 | 792 | 1,584 |
| 18 | 10 | 11 | 110 | 880 | 1,760 |
| 20 | 11 | 11 | 121 | 968 | 1,936 |
| 22 | 13 | 11 | 143 | 1,144 | 2,288 |
| 24 | 14 | 11 | 154 | 1,232 | 2,464 |

[1] As calculated by Damrow Bros., Fond du Lac., Wis.

After the loaves of curd have been pressed from 30 to 60 minutes they are taken out of the hoops and wrapped tightly and neatly in medium-weight, unbleached cotton cloth (fig. 5). The cloth should be soaked in warm water before it is used. A piece of cloth the same length as the loaf should be wrapped around the loaf and a press cloth should be placed on each end. The loaf is then put back in the hoop and pressed for not less than 8 hours. At the end of the pressing period the loaves are taken out of the hoops, and the wrappers and press cloths are removed preparatory to cutting the loaves into prints.

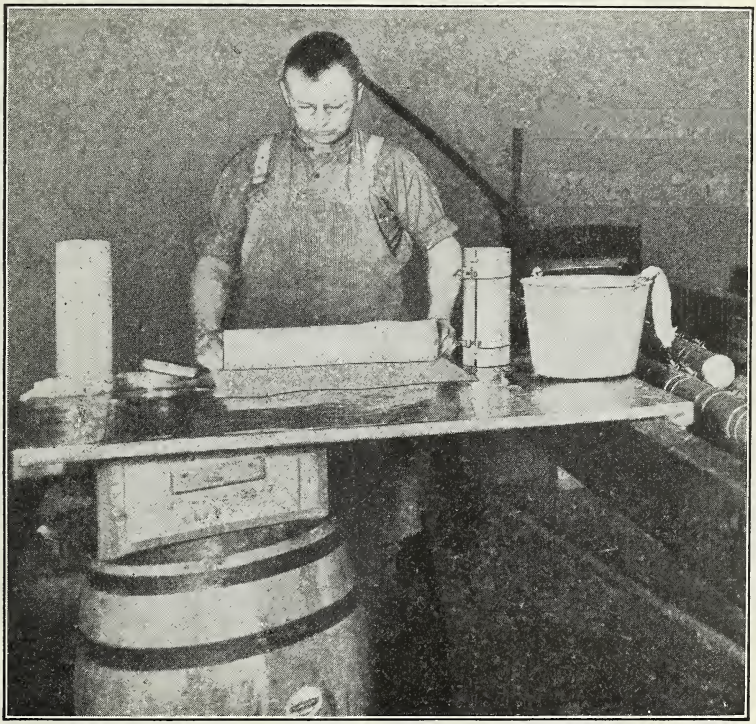

FIGURE 5.—Wrapping the loaves of pressed curd with cloth.

## CUTTING, WEIGHING, WRAPPING, AND SEALING CHEESE IN CANS

As soon as the cloth wrappers have been removed the cheese is transferred to a table where it is to be cut into prints (fig. 6). This work should be done in a room that is kept scrupulously clean and free from dust. Obviously, it is also important that the workers have clean hands.

Immediately after the cheese is cut into prints it is wrapped in cellophane or some other suitable material, and placed in clean, dry, cans. The valve-equipped covers are then sealed to the cans and the closed cans are packed in shipping cartons, placed on a truck, and taken to storage, where they are held until the cheese is cured sufficiently and is ready for marketing.

## CURING THE CHEESE

After the filled cartons have been placed in the storage room no further handling of the cheese is necessary. There is no loss from mold or shrinkage, no trouble with flies or mice, and no additional labor as in curing Cheddar cheese in the usual manner. The temperature of the storage room may be maintained between 40° and 65° F., depending on how rapidly it is desired to cure the cheese. If cheese is held at a temperature much higher than 70°, the flavor will be injured, and the surface becomes oily. Cheese held at 65° will, of course, cure more rapidly than cheese held at 40°. Canned Cheddar cheese can be held at 65° without the difficulties usually encountered in curing Cheddar cheese in the ordinary way at that temperature.

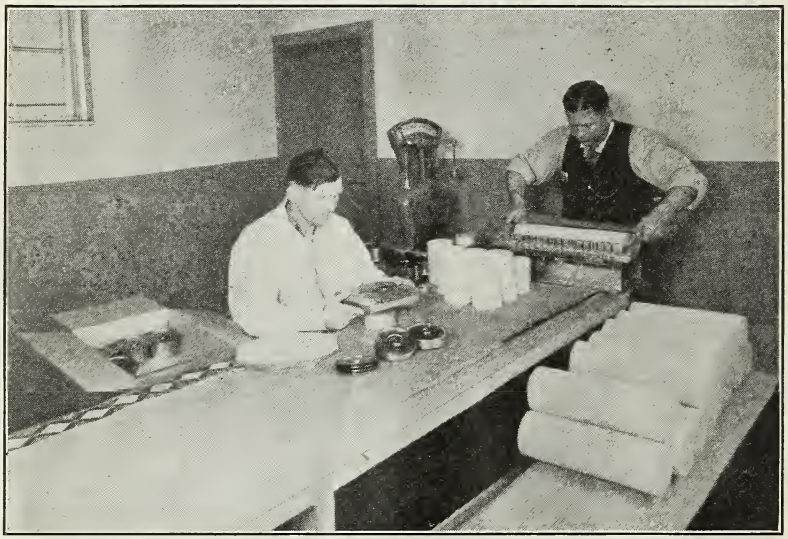

FIGURE 6.—Cutting, weighing, wrapping, and packaging the cheese in cans. The cans are then sealed and placed in the cartons.

As previously stated, the milk should be carefully graded, and before the curd is placed in the special hoops it should be carefully inspected in order to be sure that it is of satisfactory quality for canned cheese, otherwise it should be pressed in ordinary hoops and cured in the usual manner. As a further precaution against putting inferior canned cheese on the market, a can of cheese representing the make from each vat should be examined when the cheese is about 2 months old. By examining the partially cured cheese at that time it is possible to predict with a fair degree of accuracy the quality the cheese will have when cured. If it is not curing satisfactorily it should be placed at a low temperature (34° F.) immediately and marketed as mild or short-held cheese. When the cheese is curing satisfactorily it can be held for a period of from 10 to 18 months or longer and marketed as aged or sharp cheese.

If lithographed cans are used, space should be provided by the lithographer so the grade of the cheese may be stamped on the can

when the cheese is ready for shipping. If plain cans are used, the labels put on at the time of shipping should also bear a statement as to the grade of the cheese. It is generally believed that the temperature at which a product is held is unimportant if it is packed in air-tight containers. Canned cheese, however, should be held at a temperature not higher than 70° F., and this information should be printed on the label for the benefit of the consumer.

When the cheese is ready for marketing the cartons are taped and transferred to the refrigerator car (fig. 7). This type of package and carton is easy to handle and convenient to pack in a refrigerator car.

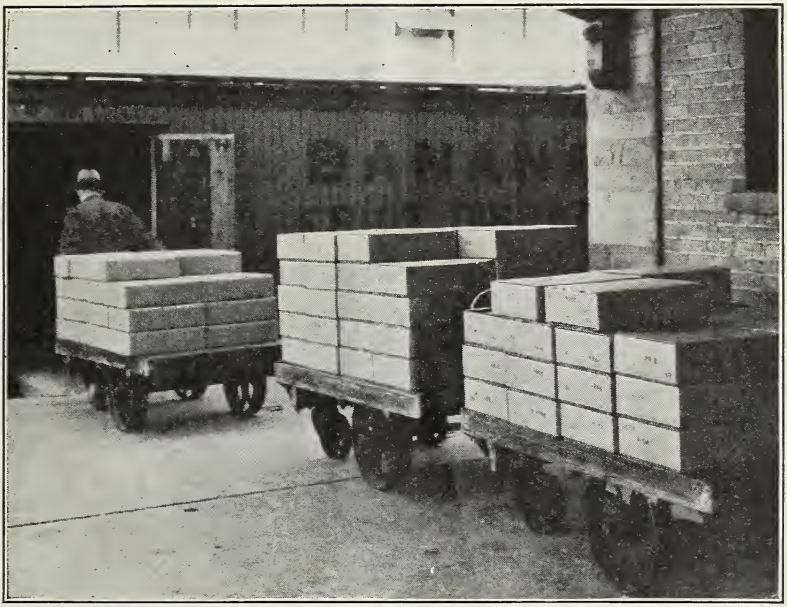

FIGURE 7.—Transferring cartons of cured canned cheese to the refrigerator car. Each carton contains twenty-four 12-ounce cans of cheese; a convenient size and shape for handling and shipping.

## LABOR

It requires more labor to put up a product in small units than in bulk or relatively large units. In canning cheese in small consumer-size units, more man-hours of labor are required at the time of hooping than in making Daisies or Longhorns, because there are more hoops to fill and handle. Additional man-hours are also required for cutting, wrapping, and sealing the cheese in cans. This work is all done in about 36 hours after the milk is received and no more labor is required until the cheese is shipped. When cheese is cured in the usual manner it must be held in a drying room about 4 days after it is taken from the press, during which time each cheese must be turned daily and the room and shelves kept clean and free from mold. At the end of about 4 days each cheese is paraffined, weighed, and boxed. It is then stored at the factory or sent to a cold-storage warehouse and held until it is cured and ready for the market. A

good many hours of labor must be spent in the drying room and storage room during the curing period to keep the cheese free from mold. If cheese becomes moldy it has to be cleaned, and sometimes reparaffined, before it is shipped. All this labor is eliminated when cheese is cured in cans, and although more man-hours are required during the first 36 hours, much labor is saved thereafter and losses are avoided.

The first extra labor in canning cheese, as compared to the usual procedure, is required when filling the hoops. A factory receiving 7,000 pounds of milk daily will make enough curd to fill about 85 hoops of the size used in canning 12-ounce prints. Filling, weighing, and putting the 85 hoops in the press will require 1⅔ man-hours of labor. It will require 3 man-hours of labor to dress 85 loaves of cheese and put them back in the press. Three men should be available to hoop and dress the cheese. At the end of the pressing period it will require 1 man-hour of labor to take cheese out of 85 hoops and remove bandages and press cloths. It will require about 2⅓ man-hours of labor to cut 85 loaves into 12-ounce prints and check the weights. It will require 2⅔ man-hours to wrap and place the 933 prints in cans, and 2 man-hours to seal the cans and pack them in shipping cartons.

## COST OF PACKAGING CHEESE

Figures indicating approximately the cost of making Cheddar cheese in the form of Daisies as compared with making and packaging 12-ounce and 5-pound prints in sealed containers have been compiled. Some of the cost figures are estimates based on average charges for labor and materials and others are actual cost figures based on small quantity production. These figures as shown in table 2 are for a factory handling 1,700,000 pounds of milk annually, and are submitted, not as actual costs of manufacturing Cheddar cheese in these various forms, but rather to indicate in a general way the comparative cost.

TABLE 2.—*Comparative cost of making Daisies and making and canning 5-pound prints and 12-ounce prints (exclusive of the cost of the milk), in a factory receiving 7,000 pounds of milk daily during the flush season or 1,700,000 pounds of 4-percent milk annually, yielding 10.6 pounds of cheese per 100 pounds of milk or a total of 180,200 pounds of uncured cheese*

| Material and labor required | Daisies | 5-pound cans | 12-ounce cans |
|---|---|---|---|
| | *Dollars* | *Dollars* | *Dollars* |
| Rennet, 53 gallons, at $2 per gallon | 106.00 | 106.00 | 106.00 |
| Color, 20 gallons, at $2.05 per gallon | 41.00 | 41.00 | 41.00 |
| Salt, 12 barrels, at $4 per barrel | 48.00 | 48.00 | 48.00 |
| Sulphuric acid, 9 gallons, at $1.30 per gallon | 11.70 | 11.70 | 11.70 |
| Miscellaneous supplies, starter, n/10 alkali, etc | 12.00 | 12.00 | 12.00 |
| Stationery, etc | 5.00 | 5.00 | 5.00 |
| Cleaning powder and brushes | 60.00 | 60.00 | 60.00 |
| Oil for separators, etc | 15.00 | 15.00 | 15.00 |
| Glassware and breakage | 12.00 | 12.00 | 12.00 |
| Retinning hoops, average for year | 15.00 | 15.00 | 15.00 |
| Allowance for repairs | 75.00 | 75.00 | 75.00 |
| Fuel | 500.00 | 500.00 | 500.00 |
| Depreciation on equipment (10 percent of $7,950) | 795.00 | 795.00 | 795.00 |
| Depreciation on building (4 percent of $4,000) | 160.00 | 160.00 | 160.00 |
| Interest on investment (6 percent of $11,950) | 717.00 | 717.00 | 717.00 |
| Insurance on building and equipment | 45.00 | 45.00 | 45.00 |
| Taxes | 50.00 | 50.00 | 50.00 |

TABLE 2.—*Comparative cost of making Daisies, etc.*—Continued

| Material and labor required | Daisies | 5-pound cans | 12-ounce cans |
|---|---|---|---|
| Labor: | *Dollars* | *Dollars* | *Dollars* |
| 1 maker, at $125 per month, 12 months | 1,500.00 | 1,500.00 | 1,500.00 |
| 1 helper, at $50 per month, 7 months | 350.00 | | |
| 2 helpers, at $50 per month, 12 months | | | 1,200.00 |
| 1 helper, at $50 per month, 6 months | | | 300.00 |
| 1 helper, at $50 per month, 12 months | | 600.00 | |
| 1 helper, at $50 per month, 6 months | | 300.00 | |
| Bandages, 9,000, at $17.80 per thousand | 160.20 | | |
| Cloth circles, 18,000, at $5 per thousand | 90.00 | | |
| Press cloths, 500, at $20 per thousand | 10.00 | | |
| Cheese boxes, 9,000, at 15 cents | 1,350.00 | | |
| Scale boards, 7 bundles, at $2.85 | 19.95 | | |
| Cloth wrappers or bandages, 372, at 17 cents per yard | | 18.60 | 18.60 |
| Cellophane sheets: | | | |
| 36,040, at $5.65 per thousand | | 203.62 | |
| 239,800, at $2.66 per thousand | | | 637.86 |
| Cartons: | | | |
| 6,006, at 9.6 cents each | | 576.57 | |
| 10,000, at 7 cents each | | | 700.00 |
| Cans: | | | |
| 36,040, at $117 per thousand | | 4,216.68 | |
| 239,800, at $42.57 per thousand | | | 10,208.28 |
| Freight on cans: | | | |
| 0.05 cent per pound of cheese | | 90.00 | |
| 0.06 cent per pound of cheese | | | 108.12 |
| Rental on closing machine | | 15.00 | 15.00 |
| Total | 6,147.85 | 10,188.27 | 17,355.56 |
| Cost per pound of cheese: [1] | | | |
| For package | .0092 | .0285 | .0650 |
| For labor | .0104 | .0133 | .0167 |
| For all other items | .0150 | .0148 | .0148 |
| Total | .0346 | .0566 | .0965 |

[1] Based on the number of pounds of cheese available for sale, after deducting a shrinkage of 1½ percent for Daisies, one-eighth of 1 percent for 5-pound prints, and one-fourth of 1 percent for 12-ounce prints.

These figures indicate that when cheese is packed and merchandised in 5-pound oblong cans or in 12-ounce round cans it would have to be sold by the manufacturer at approximately 2 and 6 cents more per pound, respectively, to net the same returns as if sold in the form of Daisies.

The 1,700,000 pounds of milk made in Daisies would make 180,200 pounds of uncured cheese which, less the normal shrinkage of 1½ percent, would leave 177,497 pounds of cheese for sale. If sold at 14 cents per pound this cheese would net $18,701.73 above the cost of making it. This, of course, does not take into consideration the additional shrinkage and labor which occurs after paraffining, if the bulk cheese is held for a period of several months.

If the same amount of milk (1,700,000 pounds) is made into cheese and packed directly from the press in 5-pound cans, allowing for one-eighth of 1 percent shrinkage in cutting, 35,995 cans will be filled. If sold at 81 cents per can, or 16.2 cents per pound, this cheese would net $18,967.68 above the cost of manufacture, or $265.95 more than when marketed in the form of Daisies at 14 cents per pound.

If 1,700,000 pounds of milk is made into cheese and packed in 12-ounce cans, allowing one-fourth of 1 percent shrinkage in cutting, 239,665 cans will be filled. If sold at 15.3 cents per can, or 20.4 cents per pound, this cheese would net $19,313.18 above the cost of manu-

facture, or $611.45 more than when marketed in the form of Daisies at 14 cents per pound.

Table 3 will serve as a guide in estimating the total cost of making, curing, and packaging Cheddar cheese in cans of 12-ounce capacity, when the cheese is made from milks having different percentages of butterfat and when the milk is purchased at different prices per pound of butterfat. The calculations are based on the manufacturing cost (7.24 cents per 12-ounce can) indicated in table 2, and on the possible yields of cheese from 100 pounds of milk, as follows: Milk testing 3.5 percent, 9.45 pounds of cheese; milk testing 4 percent, 10.6 pounds; milk testing 4.5 percent, 11.74 pounds; and milk testing 5 percent, 12.9 pounds.

TABLE 3.—*Estimated total cost of making and packaging Cheddar cheese in 12-ounce cans, when the cheese is made from milk testing from 3.5 to 5 percent butterfat, and when the milk is purchased at from 20 to 60 cents per pound of butterfat*

| Price paid for milk, per pound of butterfat | Cost per 12-ounce can of cheese, when the cost of manufacture is 7.24 cents, and the milk tests— | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 3.5 percent butterfat | | 4 percent butterfat | | 4.5 percent butterfat | | 5 percent butterfat | |
| | Cost of milk | Total cost | Cost of milk | Total cost | Cost of milk | Total cost | Cost of milk | Total cost |
| *Cents* | *Cents* | *Cents* | *Cents* | *Cents* | *Cents* | *Cents* | *Cents* | *Cents* |
| 20 | 5.55 | 12.79 | 5.66 | 12.90 | 5.74 | 12.98 | 5.81 | 13.05 |
| 25 | 6.93 | 14.17 | 7.07 | 14.31 | 7.18 | 14.42 | 7.27 | 14.51 |
| 26 | 7.22 | 14.46 | 7.35 | 14.59 | 7.47 | 14.71 | 7.56 | 14.80 |
| 27 | 7.50 | 14.74 | 7.64 | 14.88 | 7.76 | 15.00 | 7.85 | 15.09 |
| 28 | 7.77 | 15.01 | 7.92 | 15.16 | 8.04 | 15.28 | 8.14 | 15.38 |
| 29 | 8.05 | 15.29 | 8.21 | 15.45 | 8.34 | 15.58 | 8.43 | 15.67 |
| 30 | 8.33 | 15.57 | 8.49 | 15.73 | 8.62 | 15.86 | 8.72 | 15.96 |
| 31 | 8.61 | 15.85 | 8.77 | 16.01 | 8.91 | 16.15 | 9.01 | 16.25 |
| 32 | 8.88 | 16.12 | 9.06 | 16.30 | 9.20 | 16.44 | 9.30 | 16.54 |
| 33 | 9.16 | 16.40 | 9.34 | 16.58 | 9.49 | 16.73 | 9.59 | 16.83 |
| 34 | 9.44 | 16.68 | 9.62 | 16.86 | 9.77 | 17.01 | 9.88 | 17.12 |
| 35 | 9.72 | 16.96 | 9.90 | 17.14 | 10.06 | 17.30 | 10.17 | 17.41 |
| 36 | 9.99 | 17.23 | 10.19 | 17.43 | 10.35 | 17.59 | 10.47 | 17.71 |
| 37 | 10.28 | 17.52 | 10.47 | 17.71 | 10.64 | 17.88 | 10.76 | 18.00 |
| 38 | 10.55 | 17.79 | 10.75 | 17.99 | 10.92 | 18.16 | 11.05 | 18.29 |
| 39 | 10.83 | 18.07 | 11.04 | 18.28 | 11.21 | 18.45 | 11.34 | 18.58 |
| 40 | 11.11 | 18.35 | 11.32 | 18.56 | 11.50 | 18.74 | 11.63 | 18.87 |
| 45 | 12.50 | 19.74 | 12.73 | 19.97 | 12.94 | 20.18 | 13.08 | 20.32 |
| 50 | 13.89 | 21.13 | 14.15 | 21.39 | 14.37 | 21.61 | 14.53 | 21.77 |
| 60 | 16.66 | 23.90 | 16.98 | 24.22 | 17.25 | 24.49 | 17.44 | 24.68 |

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